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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/722,929  
Filing Date: November 26, 2003  
Appellant(s): RYND ET AL.

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Jason S. Fokens  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed May 29, 2009 appealing from the Office  
action mailed November 20, 2008.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The rejection of claims 7 and 8 under 35 U.S.C 112, second paragraph.

#### **(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

#### **(8) Evidence Relied Upon**

WO01/39954	GRINSHPUN et al.	6-2001
2005/0027040	NELSON et al.	2-2005
6,589,646	MORGANSTERN	7-2003
7,160,929	TAN	1-2007
WO03/055804	CHEN et al.	7-2003
WO01/40362	MILLER et al.	6-2001
2004/0234443	CHEN et al.	11-2004

#### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-8 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grinshpun et al. (WO 2001/39954) in view of Nelson et al. (US 2005/0027040).

Regarding claim 1, Grinshpun et al. teach a method of manufacturing a rigid foam (Figure 6; page 10, lines 5-30) comprising: incorporating fillers and reinforcing materials such as graphite, conductive carbon black, calcium carbonate, and nanofillers into a polymer (page 17 lines 12-20) and at least one nucleating agent (page 19, line 38 – page 20, line 5), including

conventional nucleating agents such as calcium carbonate, incorporating a blowing agent into the melt under a first pressure and a first temperature (page 20, lines 7-30), extruding the polymer melt under a second pressure and temperature to allow the polymer melt to expand and foam, and cooling the foamed product (page 21, lines 9-30) to produce a foam consisting primarily of blends of polystyrene (page 14, line 41-page 15 line 42; page 24), with a cell size ranging from 25 to 7000 micrometers (page 23, lines 11-15). Grinshpun et al. do not explicitly teach that the calcium carbonate employed as a nucleating agent or as a filler/reinforcing material has a particle size in at least one dimension of less than 100 angstroms.

However, Nelson et al. disclose a method wherein inorganic additives such as nanoparticles of calcium carbonate are combined with resin to form nanocomposite additives for extrusion processes, wherein the calcium carbonate employed to form the nanocomposite has a particle size as low as about 2 nm (20 angstroms) (see paragraphs [0038-0043] specifically and the Abstract and paragraphs [0004, 0008, 0012, 0019, 0020, 0051, 0052, 0056, 0079] for context).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have modified the method of Grinshpun and to have employed the calcium carbonate nanocomposites disclosed Nelson et al., for the purpose, as suggested by Nelson et al., of improving the blendability of the additives and improving the mechanical and thermal properties of the article to be produced.

As to claims 2-4, Grinshpun teaches blends primarily comprising polystyrene (page 14, line 41-page 15 line 42; page 24).

As to claims 5 and 6, Grinshpun teaches various blowing agents may be employed (page 18, lines 6-30).

As to claims 7 and 8, Grinshpun teaches incorporating additives into the polymer melt such as nucleation agents, fillers and pigments (page 17, lines 12-20; page 19, line 38 - page 20, line 30).

As to claims 10-13, Grinshpun discloses employment of polystyrene as the resin and Nelson discloses and suggests intercalating the additive in polystyrene/the resin that the additive is ultimately to be extruded with (paragraphs [0015, 0019, 0020, and 0040-0043]). Grinshpun discloses the nucleating agent can be added within a range of 0.01 to 5 parts by weight per hundred parts by weight of resin (page 19, line 38-page 20 line 5).

As to claims 14 and 15, Grinshpun teaches the foam has a density of 8 to 640 kg/m<sup>3</sup> (page 13, lines 4-22; page 24, lines 25-37) and that the cell size is between 25 and 7000 micrometers (page 23, lines 11-15). Grinshpun is silent as to the other cell structure parameters. However, the combination employs the same claimed materials and the same claimed process. Accordingly, the same claimed physical properties and effects would intrinsically be achieved by the practice of the combined method.

Claims 1-8, 10-12, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grinshpun et al. (WO 2001/39954) in view of Morgenstern (US 6,589,646).

Regarding claim 1, Grinshpun et al. teach a method of manufacturing a rigid foam (Figure 6; page 10, lines 5-30) comprising: incorporating fillers and reinforcing materials such as graphite, conductive carbon black, calcium carbonate, and nanofillers into a polymer (page 17 lines 12-20) and at least one nucleating agent (page 19, line 38 – page 20, line 5), including conventional nucleating agents such as calcium carbonate, incorporating a blowing agent into the melt under a first pressure and a first temperature (page 20, lines 7-30), extruding the polymer melt under a second pressure and temperature to allow the polymer melt to expand

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and foam, and cooling the foamed product (page 21, lines 9-30) to produce a foam consisting primarily of blends of polystyrene (page 14, line 41-page 15 line 4; page 24), with a cell size ranging from 25 to 7000 micrometers (page 23, lines 11-15). Grinshpun et al. do not explicitly teach that the calcium carbonate employed as a nucleating agent or as a filler/reinforcing material has a particle size in at least one dimension of less than 100 angstroms.

However, Morgenstern discloses that calcium carbonate having a particle size as low as 0.005  $\mu\text{m}$  (50 angstroms) may be employed as a nucleating agent in foam applications (Abstract; col. 2, lines 58-67).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have modified the method of Grinshpun and to have employed the calcium carbonate disclosed by Morgenstern for the purpose of employing an art recognized suitable and conventional nucleating agent to produce a foam product (MPEP 2144.06-2144.07).

As to claims 2-4, Grinshpun teaches blends primarily comprising polystyrene (page 14, line 41-page 15 line 42; page 24).

As to claims 5 and 6, Grinshpun teaches various blowing agents may be employed (page 18, lines 6-30).

As to claims 7 and 8, Grinshpun teaches incorporating additives into the polymer melt such as nucleation agents, fillers and pigments (page 17, lines 12-20; page 19, line 38 - page 20, line 30).

As to claims 10-12, Grinshpun discloses polystyrene and that the nucleating agent can be added within a range of 0.01 to 5 parts by weight per hundred parts by weight of resin (page 19, line 38 – page 20, line 5). Morgenstern discloses employment of from 0.1 to 10% by weight of the nucleating agent (col. 3, lines 1-4).

As to claims 14 and 15, Grinshpun teaches the foam has a density of 8 to 640 kg/m<sup>3</sup> (page 13, lines 4-22; page 24, lines 25-37) and that the cell size is between 25 and 7000 micrometers (page 23, lines 11-15). Grinshpun is silent as to the other cell structure parameters. However, the combination employs the same claimed materials and the same claimed process. Accordingly, the same claimed physical properties and effects would intrinsically be achieved by the practice of the combined method.

Claims 1-8, 10-12, 14, 15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grinshpun et al. (WO 2001/39954) in view of Chen et al. (WO 2003/055804) and Tan (US 7,160,929). *Note: Citations to Chen et al. are from the US equivalent document US 2004/0234443.*

Regarding claims 1 and 21, Grinshpun et al. teach a method of manufacturing a rigid foam (Figure 6; page 10, lines 5-30) comprising: incorporating fillers and reinforcing materials such as graphite, conductive carbon black, calcium carbonate, and nanofillers into a polymer (page 17 lines 12-20) and at least one nucleating agent (page 19, line 38 – page 20, line 5), including conventional nucleating agents such as calcium carbonate, incorporating a blowing agent into the melt under a first pressure and a first temperature (page 20, lines 7-30), extruding the polymer melt under a second pressure and temperature to allow the polymer melt to expand and foam, and cooling the foamed product (page 21, lines 9-30) to produce a foam consisting primarily of blends of polystyrene (page 14, line 41-page 15 line 4; page 24), with a cell size ranging from 25 to 7000 micrometers (page 23, lines 11-15). Grinshpun do not disclose utilizing calcium carbonate having a particle size in at least one dimension of less than 100 angstroms (claim 1) or acicular calcium carbonate (claim 21) with a particle size in at least one dimension of less than 100 angstroms.



However, Chen et al. disclose employment of calcium carbonate needles having a particle size as low as 10 nm (100 angstroms) and fibers having a particle size as low as 1 nm (10 angstroms) that are suitable for strengthening the mechanical properties of plastic materials (Abstract; paragraphs [0003;0049]). Additionally, Tan discloses employment of nanofibers and nanopowders, such as calcium carbonate, in the production of nanocomposite foams (Abstract; col. 1, lines 18-64; col. 3, lines 1-21; col. 3, lines 64-67; col. 4, lines 63-col. 5, lines 17; col. 8, lines 25-34).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed calcium carbonate having a particle size of less than 100 angstroms in the method of Grinshpun, including acicular calcium carbonate, as suggested by Chen et al. and Tan, for the purpose, as suggested by Tan of producing a lightweight material having superior mechanical properties (col. 3, lines 15-20). Further, regarding the exact particle size of the calcium carbonate needles of Chen et al., the examiner submits that at the upper end of the range "less than 100 angstroms" one skilled in the art would have expected the calcium carbonate needles to have had the same properties as at the lower end of the range disclosed by Chen et al. (i.e. 100 angstroms). See MPEP 2144.05 I.

As to the claimed cell orientation of claim 21, the examiner submits the combination suggests employing the same claimed process steps and substantially the same claimed materials. As such, the examiner submits the same claimed effects and physical properties would be achieved by the practice of the combined method.

As to claims 2-4, Grinshpun teaches blends primarily comprising polystyrene (page 14, line 41-page 15 line 42; page 24).

As to claims 5 and 6, Grinshpun teaches various blowing agents may be employed (page 18, lines 6-30).

As to claims 7 and 8, Grinshpun teaches incorporating additives into the polymer melt such as nucleation agents, fillers and pigments (page 17, lines 12-20; page 19, line 38 - page 20, line 30).

As to claims 10-12, Grinshpun employ polystyrene as the resin and disclose that the nucleating agent can be added within a range of 0.01 to 5 parts by weight (page 19, line 38- page 20 line 5).

As to claims 14 and 15, Grinshpun teaches the foam has a density of 8 to 640 kg/m<sup>3</sup> (page 13, lines 4-22; page 24, lines 25-37) and that the cell size is between 25 and 7000 micrometers (page 23, lines 11-15). Grinshpun is silent as to the other cell structure parameters. However, the combination employs the same claimed materials and the same claimed process. Accordingly, the same claimed physical properties and effects would intrinsically be achieved by the practice of the combined method.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (WO 01/40362) in view of Chen et al. (WO 2003/055804) and Tan (US 7,160,929). *Note: Citations to Chen et al. are from the US equivalent document US 2004/0234443.*

Regarding claim 21, Miller et al. teach the basic claimed process of producing an extruded rigid foam to produce an insulating panel (page 10, lines 21-24) wherein a blowing agent is incorporated into the polymer melt at a first pressure and temperature (page 6, line 5-31); extruding the polymer melt under a second pressure and temperature to form a foam and intrinsically cooling the foam to form a product with a cell size within the claimed range (page 2, line 19-page 3, line 24; page 9, line 13-page 10, line 25). The preferred polymer melt includes an alkenyl aromatic polymer material, such as polystyrene (page 3, line 25- page 4, line 28). Miller et al. teach the cell orientation is greater than 0.95 (claim 12). Miller et al. further teach

that optional additives, including fillers, may be included to obtain desired foam characteristics (page 5, lines 8-15) and employ talc and titanium dioxide as nucleating agents (page 4, line 30-page 5, line 5; page 1, line 28-34), but do not disclose utilizing acicular calcium carbonate with a particle size in at least one dimension of less than 100 angstroms. However, Chen et al. disclose employment of calcium carbonate needles having a particle size as low as 10 nm (100 angstroms) and fibers having a particle size as low as 1 nm that are suitable for strengthening the mechanical properties of plastics (Abstract; paragraphs [0003;0049]). Additionally, Tan discloses employment of nanofibers and nanopowders, such as calcium carbonate, in the production of nanocomposite foams (Abstract; col. 1, lines 18-64; col. 3, lines 1-21; col. 3, lines 64-67; col. 4, lines 63-col. 5, lines 17; col. 8, lines 25-34).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have employed calcium carbonate having a particle size of less than 100 angstroms in the method of Miller, including acicular calcium carbonate, as suggested by Chen et al. and Tan, for the purpose, as suggested by Tan of producing a lightweight material having superior mechanical properties (col. 3, lines 15-20). Further, regarding the exact particle size of the calcium carbonate needles of Chen et al., the examiner submits that at the upper end of the range "less than 100 angstroms" one skilled in the art would have expected the calcium carbonate needles to have had the same properties as at the lower end of the range disclosed by Chen et al. (i.e. 100 angstroms). See MPEP 2144.05 I.

#### **(10) Response to Argument**

Appellant's argument essentially alleges that the examiner has failed to establish a *prima facie* case of obviousness because the foam product produced by the primary reference employed in the rejections, Grinshpun et al. (WO 01/39954), is not a rigid foam board, but a

multi-strand coalesced extrudate. The examiner disagrees with appellant's argument and submits that Grinshpun et al. do teach and disclose a rigid foam board and that, in combination with the secondary references set forth in the final office action, a *prima facie* case of obviousness has been established.

For the sake of clarity, the examiner notes that parallel rejections have been employed in this application to fully address the claimed nano-particles. The prior art arguments in the brief, however, are substantially directed only to the common primary reference, Grinshpun et al.

1. Appellant argues that the extrusion process of Grinshpun et al. is to form hollow tubes/strands not a foam board under a second pressure and temperature that is sufficient to allow the polymer melt to expand and form a foam board.

Appellant's argument appears to suggest that the extrusion of strands that expand and coalesce upon extrusion to form a singular sheet structure can not be understood to be the extrusion of a foam board as set forth in the claims. This argument is not persuasive. As an initial matter, the examiner submits and notes that Grinshpun et al. teach extruding a polymer melt (i.e. in the case of polystyrene, a crystal polymer, at a temperature above the glass transition temperature – see paragraph [0010] of the instant specification published as US 2005/0112356 describing the term polymer melt) as a foamable composition (page 20, lines 22-24, "step two"; also see page 2, lines 14-28) and that the extrusion of the foamable composition, in the form of strands, allows the foamable composition to expand and form a coalesced strand foam product (page 20, lines 26-31). The extrusion of the polymer melt is performed at an appropriate temperature (page 3, lines 25-34) and pressure (page 22, lines 20-30). The strands of Grinshpun are coalesced as part of the expansion that occurs with the extruding step. Grinshpun teaches, for example, that "[u]pon extrusion the foamed hollow strands adhere to

each other to form a coalesced strand foam product" (page 24, lines 32-34; also see page 21, lines 3-8 which describes the coalescence that occurs as the strands exit the die and expand). As such, Grinshpun et al. teach extruding a foamable composition as a polymer melt under an appropriate pressure and temperature (i.e. a second pressure and temperature) that is sufficient to allow the polymer melt to expand and form a foam product. Further, as set forth below, the foam product is a foam board.

Grinshpun et al. teach the coalesced strand foam product may take the form of a "foam sheet" (page 11, line 9 and lines 30-32) that has a "rectangular structure" (page 11, lines 37-39) and that the foam sheet may have a width of 48-inches and a length of 4 to 16 feet (page 11, lines 16-32). Further, it is noted that in discussing the length, Grinshpun refers to the "board" length (page 11, line 27). Further still, Grinshpun et al. teach the product is suited for "stud wall construction and insulation" (page 10, line 42), that the product can be "used as a leveling board" (page 12, line 6), that the foam structure can be laminated to boards (page 12, lines 19-23), and that a "board with [a] rigid center" may be produced (page 14, lines 16-17). The examiner also notes and submits, as an example, that oriented strand board (OSB) is made of "strands" but is also still quite properly understood to be a "board". Therefore, the examiner submits that the product formed by Grinshpun et al. is a foam board made of strands and that the argued limitation is clearly met by Grinshpun et al.

2. Appellant argues that the foam sheet produced by the coalesced material of Grinshpun et al. is not rigid because the hollow foam strands/tubes are flexible and compressible. Appellant argues that a rigid board, as claimed, is suited for use in nearly all aspects of building construction to provide thermal resistance and that the sheet of Grinshpun et al. is not a board because it is not rigid.

This argument is not persuasive. It is noted that Grinshpun et al. also disclose employing solid strands in addition to the hollow strands (Figure 4 and Figure 6), for example, "when used in conjunction with a framing stud member of a building wall segment" (page 10, lines 5-10) and that the solid strands provide a "stiff or rigid surface that facilitates further construction activities" (page 10, lines 10-13). Thus, while the hollow strands are more flexible and compressible than the solid strands (page 10, lines 17-19), the solid strands provide the required rigidity (page 10, lines 10-13 and page 11, lines 37-40). Further, Grinshpun et al. teach the product, depending on the application, may have "dozens of solid foam strand layers" and as few as "one hollow strand foam layer" (page 10, lines 22-28) and further disclose in one embodiment that a "board with [a] rigid center" can be produced (page 14, lines 16-17). Further, Grinshpun et al. teach the material is suitable as an insulating means for walls, roofs, and floors (page 11, lines 34-40) (i.e. the board of Grinshpun et al. is also suited for a variety of building construction applications to provide thermal resistance in the same manner as set forth in the arguments). Accordingly, the examiner submits that while Grinshpun et al. may disclose a variety of uses for their foam board and that these uses may require varying degrees of rigidity, they also teach and disclose a rigid foam board as set forth in the claims.

Appellant further points to Table 1 in the instant specification and argues that the exemplified dies employed to produce a rigid foam board are different than the die employed by Grinshpun et al. This argument is not persuasive. The examiner submits that there is nothing in the claims to exclude the die employed by Grinshpun et al. and that Grinshpun et al. form a rigid foam board as set forth above.

3. Appellant argues that Grinshpun et al. teach away from manufacturing a rigid foam board because Grinshpun et al. teach the extrusion of hollow tubes and the hollow tubes are flexible and compressible.

This argument is not persuasive. For the reasons set forth above, the examiner submits that Grinshpun et al. teach and disclose the extrusion of a polymer melt under an appropriate pressure and temperature (i.e. a second pressure and second temperature) to expand and form a rigid foam board and as such they do not teach away from such a process.

4. Appellant argues that none of the secondary references applied in separate rejections (i.e. Nelson et al., Morgenstern, Chen et al. and Tan et al.) make up for the rigid foam board deficiency of Grinshpun et al.

This argument is not persuasive. For the reasons set forth above, the examiner submits that Grinshpun et al. teach and disclose the extrusion of a rigid foam board and that accordingly Grinshpun et al. is not deficient in the manner argued.

5. Appellant argues that one having ordinary skill would not have been motivated to arrive at the method of claim 1 based upon the teachings of Grinshpun et al. and any of the secondary references because none of the references teach or suggest a method of manufacturing a rigid foam board as claimed.

This argument is not persuasive. For the reasons set forth above, the examiner submits that Grinshpun et al. teach extruding a polymer melt under an appropriate pressure and temperature (i.e. a second pressure and second temperature) to expand and form a rigid foam board. As such, the argued limitation is met by Grinshpun et al. The secondary references are

not applied for the teaching of a rigid foam board, but are provided for their teaching of suitable nano-fillers and/or nucleating agents as set forth in the rejection.

6. In Section E, appellant does not substantively argue the rejection of claim 21 based upon Miller et al. (WO 01/40362) in view of Chen and Tan and states their desire to cancel the claim.

Accordingly, the examiner points to the rejection of claim 21 in the final rejection and submits that no additional response is necessary.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jeff Wollschlager/  
Examiner, Art Unit 1791

Conferees:

/Christina Johnson/

Supervisory Patent Examiner, Art Unit 1791

/Anthony McFarlane/